



THE PHYSICO-CHEMICAL PARAMETERS OF DHARAMSAGAR THANDA POND, KONCHAVARAM, CHINCHOLI TALUK, GULBARGA DISTRICT, KARNATAKA, INDIA

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ABSTRACT

The present work is an attempt to assess the Physico-chemical parameters of the Dharamsagar Thanda Pond, Kunchavaram, Chincholi Taluk, Kalaburagi District, Karnataka State, India. To determine suitability of the water for human consumption and other domestic uses. Monthly water samples are collected from different places of the Dharamsagar Thanda Pond were observed, which is 586 meters above the sea level and Latitude-17°31'48.55"N Longitude- 77°32'19.24"E. The present investigation was focused to carry out Atmosphere and Water Temperature, Total dissolved solids, pH, Dissolved oxygen, CO₂, Alkalinity, Hardness, Calcium, Chloride, Phosphate and BOD were observed. The obtained results revealed that the condition of this Pond in different months during the study period shows fluctuations in the physico-chemical parameters and showed pollution status of this Pond. It was found that the water samples collected from various sites in and around Dharamsagar Thanda village was contaminated. All sampling sites showed physicochemical parameters above the water quality standards and the quality of water is not good and it is not fit for drinking purpose.

KEY WORDS: Physico-chemical parameters, Dharamsagar Thanda Pond, Monthly fluctuations.

INTRODUCTION:

Water is one of very important compound of the ecosystem, due to increased human population, use of fertilizers in the agriculture and man-made activity, industrialization. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota. Therefore it is important to check the water quality of drinking water at regular time of interval, because due to use of contaminated drinking water, human population suffers from different water borne diseases. (Basavaraja Simpi et al., 2011) Therefore the conservation of water environment and its monitoring is very important. Unplanned urbanization, rapid industrial and indiscriminate use of toxic chemicals in agriculture causing heavy and varied pollution in aquatic environment leading to deterioration of fresh water quality and depletion of aquatic fauna. Ponds are important wetlands located in and around human habitations as they are generally semi natural ecosystems constructed by man in landscape suitable for water stagnation (Priyanka Yadav et al., 2013)

MATERIALS AND METHODS:

Collection and Sampling: For the present study, water samples were collected from the different places are from same pond of Dharamsagar Thanda, Konchavaram forest, Taluka Chincholi, District Kalaburagi, Karnataka, (India). Water samples were collected in the period of February - 2013 to January - 2014 and were carried by plastic cans. Samples were collected during 07:00 am to 10:30 am to analyze the physicochemical parameters Dharamsagar Thanda Pond.

Laboratory analysis: The Water samples were brought to the laboratory and the physico-chemical analysis of water samples were done by following standard methods suggested by APHA, AWWA, WPCI (2005).

RESULTS AND DISCUSSIONS:

Water quality of any of the water body varies from time to time and place to place due to influence of regional factors. After analyzing the data from the three different lakes under study, we have an idea about the changing pattern of hydrological parameters. The numerical data of water quality of these sample stations were presented in the table no.1. In the study fluctuation in physicochemical parameters observed were as follows

Atmospheric and Water Temperature:

Temperature is a physical factor that changes the water characteristics and considered as an important factor in controlling the fluctuation of plantation and functioning of water bodies. (Wetzel, 1975; Dwivedi and Pandey, 2002; Singh and Mathur, 2005). In the present investigation seasonal variability of atmospheric and water temperature have been observed. Atmospheric Water and Temperature more during summer comparatively less during monsoon and minimum during winter. Kannan and Job (1980) also found similar results as observed in the present study. It is now a well known fact that smaller the body of water, more quickly it reacts to the changes in the atmospheric temperature (Welch, 1952; Ghosh and Basu, 1968; Young, 1975; Sehgal, 1980; Jayanti, 1994; Joshi and Singh, 2001).

Total dissolved solids:

Water is a universal solvent and has a large number of salts dissolved in it which largely govern in physico-chemical properties. The maximum value of total dissolved solids were recorded in August (327.96mg/l) and minimum were recorded in November (95.6 mg/l). Seasonal variations showed maximum values in summer followed by rainy season and minimum during the winter season. The maximum value of TDS during rainy season was due to mixing of domestic waste water, sewage etc. in the natural surface of water body (Verma et al., 2012). The water containing more than 500 mg/l of TDS does not qualify for drinking purposes. Hence, 500mg/l is desirable limit and 1500 mg/l maximum possible limit for domestic use (ICMR, 1975).

pH

Welch (1952) states that the limnological value of pH is a limiting factor and works as an index of general environmental condition. The pH value of the pond showed alkaline trend with a few variations. The maximum pH value were in the month of December i.e. 10.2 and minimum in the month of April i.e. 8.14. It is evident from the data that the pH declines during the rainy and increases during summer. Sharma et al., (1984) states that in India, many small confined water pockets are particularly alkaline in nature. Seasonal fluctuations are small indicating good buffering capacity. It has been suggested that the high pH is normally associated with a high photosynthetic activity in water (Goel et al., 1986; Wani and Subla, 1990). High value also helps the growth of algae and results maximum bloom of phytoplankton (George, 1962; Nandan and Patel, 1992).

Dissolved Oxygen

Oxygen is important for all organisms and affects the solubility of many nutrients (Wetzel, 1983). Fritsch (1907) stated that the oxygen contents in tropical water would be low considering their high temperature. The results of the present study showed that highest peak value of dissolved oxygen was recorded during the month of January i.e. 9.56 mg/l and least in the month of June i.e. 6.14 mg/l. The value increased from July to January and then decreased from February to June. Results of the present study are similar to those reported by other (Prasad et al., 1985; Hulyal and Kaliwal, 2011; Ramulu and Benarjee, 2013).

Free Carbon dioxide

The value of free CO₂ was ranges from 1.32 mg/l to 12.34 mg/l. The maximum value (12.34 mg/l) was recorded in the month of December and minimum value (1.32 mg/l) in the month of January to March. This may be depends upon alkalinity and hardness of water body. The value of CO₂ was high in December. This could be related to the high rate of decomposition in the warmer months.

Total Alkalinity

Alkalinity is due to the function of bicarbonate and carbonates in water. Their salts get hydrolyzed in solution and produces hydroxyl ion. It is also used as a measure of productivity (Jhingran, 1982; Hulyal and Kaliwal, 2011). In the present study the total alkalinity value between 128.95 to 178.14 mg/l. Seasonally highest value was recorded during rainy and lowest during the summer season. Alkalinity is more in rainy season were due to inflow of water

and dissolution of calcium carbonate ion in the water column (Padma and eriakali, 1999).

Hardness

Hardness of water is principally due to salts of Ca^{++} and Mg^{++} mainly the carbonates and sulphates (Wadia, 1961). In the present study the total hardness of water ranged from 46.6 mg/l to 111.65 mg/l. Seasonally, highest value was recorded during summer and lowest during the rainy season. Similar observations were found by various workers (Kumar, 1995; Naiak and Purohit, 1996; Kaur et al., 2000; Nair, 2002). Hulyal and Kaliwal (2011) found that higher value in summer and lower in winter season. They attributed it to decreases in water volume and increases in rate of evaporation at high temperature. Kiran (2010).

Calcium:

Calcium is an essential and important nutrient for aquatic organisms being a cell wall constituent and regulatory factor for physiological function. It is commonly found in all water bodies (Chourasia and Adoni 1985; Ansari and Prakash, 2000). Calcium content of pond water ranged from 43.16 mg/l to 102.68 mg/l. It was observed that the value of calcium gradually increases from July to December (34.16 to 58.25 mg/l) and then slightly decreased from January to March (48.54 to 38.44 mg/l). Seasonal mean values indicate that it was higher during the winter and lower during the summer. Munawar (1970) also noted higher value of calcium during winter season.

Chloride

The chloride content showed marked seasonal variation being maximum during rainy and minimum during winter season, which is the agreement with the observation made by Saha and Pandit, (1985) and Hulyal and Kaliwal, (2011). Higher concentration of chloride content was found during the rainy season may be attributed to increasing the organic waste of human origin with runoff water. Munawar (1970) suggested that higher value of chloride in water as an index of pollution of animal origin.

Phosphate

The results of present study showed that high phosphate concentration is

observed in the month of August i.e. 0.852 mg/l and less in January i.e. 0.254 mg/l. It is evident from the data that seasonally phosphate concentration in the pond was more in summer followed by rainy followed by a decline in winter season. The increase in the concentration of phosphate during rainy season is due to the entry of domestic sewage. Comparatively higher values of total alkalinity may be attributed to the hardness.

Biochemical Oxygen Demand

BOD is dissolved oxygen required for aerobic decomposition of organic matter present in water. Jain and Dhanija (2000) have considered BOD as an vital parameter in water body to establish the status of pollution. The observation of the present study showed that maximum value of BOD (15.26 mg l^{-1}) during the June and minimum (10.86 mg l^{-1}) in January. Seasonally, the BOD was highest during late summer early rainy season. High BOD may be due to the presence of several microbes in water bodies which accelerate their metabolic activities and domestic waste pouring into the pond with run off in rainy season (Kaushik and Saksena, 1999). During study the BOD in different season indicating pond status as moderately polluted.

ACKNOWLEDGEMENT:

Authors are thankful to Head Department of Zoology, S. B college of science and Gulbarga University, Kalaburagi for providing necessary facilities in the progress of work.

CONCLUSION:

The study revealed that there were variations in certain physico-chemical properties of Dharamsagar Thanda Pond, Konchavaram forest, Taluka Chincholi, District Kalaburagi, Karnataka, (India) due to the surface run-off and other excessive human activities. The results were compared with the standard values prescribed by the Bureau of Indian Standards (BIS) and World Health Organization (WHO). Except turbidity, all the other physico-chemical characteristics were found within permissible limits as suggested by Zafer (1964) and Khan & Siddiqui (1971). Therefore, the present investigation based on scientific methodology clearly shows that the said study Pond water can be easily used for drinking and cooking purpose after proper treatment. District Kalaburagi



Map Showing Dharamsagar Thanda Pond

Table1. Monthly variations in physico-chemical parameters of Dharamsagar Thanda Pond (During February 2013 to January 2014)

	February 2013	March	April	May	June	July	August	Sept.	October	November	December 2013	January 2014
Atmosphere temperature (°C)	30.05	38.04	40.04	40.27	39.42	31.63	31.25	29.86	27.85	28.85	24.80	24.69
Water temperature (°C)	22.57	21.45	25.23	26.91	21.21	22.87	20.28	20.25	21.25	19.51	21.15	19.05
TDS (mg/L)	292.82	231.67	227.52	294.72	257.65	243.46	327.96	122.45	96.12	95.6	150.28	171.16
pH	9.94	9.01	8.14	8.45	9.24	8.24	10.01	8.83	9.2	9.12	10.2	9.93
DO (mg/L)	7.95	8.98	8.10	7.89	6.14	7.23	6.31	6.24	8.48	8.13	7.19	9.56
CO ₂ (mg/L)	1.36	1.32	5.21	5.01	6.02	6.12	6.72	7.56	10.5	11.39	12.34	1.65
Alkalinity (mg/L)	178.14	145.78	128.95	175.52	164.88	148.92	166.74	155.54	131.28	134.22	138.54	162.26
Hardness (mg/L)	84.94	95.92	108.06	105.65	111.65	73.78	81.01	65.23	46.6	67.16	78.51	68.56
Calcium (mg/L)	70.16	88.44	102.68	82.54	66.44	34.16	40.54	41.25	46.24	54.47	58.28	58.54
Chloride (mg/L)	38.14	39.28	39.13	40.25	46.74	46.54	43.96	44.94	34.84	32.04	31.05	38.08
Phosphate (mg/L)	0.487	0.518	0.456	0.582	0.659	0.781	0.852	0.756	0.659	0.554	0.478	0.254
BOD (mg/L)	11.06	11.21	10.98	11.88	15.24	15.19	15.15	12.98	13.94	14.02	10.93	10.86

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